

Mississippi Morbidity Report

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Methyl Parathion Contamination of a Large Number of Homes

Methyl parathion has been and remains an important restricted use cholinesterase inhibiting organophosphate insecticide in Mississippi and other agricultural states. Mississippi has recorded a number of deaths through its accidental ingestion and illegal indoor use. Two children died and five additional siblings were hospitalized in one 1984 incident. At least five deaths have occurred from ingestion of methyl parathion from illegal containers (mostly ½ pint liquor bottles) since 1986. These historical incidents were randomly scattered through the state and no evidence of organized activity was apparent. There was one illegal pest control operator found in the mid 1980's which the Mississippi Department of Agriculture and Commerce, Bureau of Plant Industries (BPI) took action against with the encouragement and assistance of the Mississippi State Department of Health (MSDH). There have been few documented incidents of illness associated with the proper agricultural use of this chemical in Mississippi during recent years.

The random, periodic problems associated with the misuse of methyl parathion took a severe turn in late 1996 with the discovery of widespread spraying of homes and businesses in the Pascagoula and Moss Point areas. Two persons were found to have been operating illegal pest control services. One of these had been issued official warning notices by BPI and restraining orders (temporary and permanent) by a local judge. The MSDH was notified by BPI and US Environmental Protection Agency (EPA) Pesticide Branch that the apparent extent of the problem was growing larger the more they investigated. A decision was made by involved agencies to go public by means of a press conference in early November. Within days the agencies had to send additional personnel to handle the tremendous load of calls and inspection requests. An algorithm was developed to prioritize the inspection requests. The Mississippi State Chemical Laboratory took the lead for residue analysis of environmental inspection samples. The Agency for Toxic Substances and Disease Registry (ATSDR) was contacted for assistance in health assessment when the first round of environmental results were obtained. The MSDH accepted the decision protocol used in a similar incident in Lorraine, Ohio during 1994. This protocol recommended actions based on environmental and/or bio-monitoring of exposed residents or occupants. The Environmental Health Laboratory of the Center for Environmental Health at CDC started para-nitrophenol (p-NP) testing on urine samples obtained from residents of contaminated homes and daycare centers. EPA Super Fund became involved with the relocation of residents and the decontamination of homes and businesses. The

MSDH declared an agency emergency and dispatched additional personnel from Emergency Medical Services to assist in setting up a mobile command center due to the impact on normal operations at the local health department. By early December of 1996, there were 21 federal and state agencies or branches of agencies onsite. Numerous reports and rumors of illness associated with exposure were received and approximately 80 medical records and charts were reviewed. No physician documented cases of overt poisonings were found despite the large number of anecdotal reports. The University of Mississippi Medical center assisted by providing clinical toxicology services for referred patients and the Mississippi Regional Poison Control Center assisted in taking health related calls from citizens and health care providers.

By early 1997, the US EPA and involved states (Mississippi, Alabama [Mobile County], and Louisiana) began a review of the appropriateness of the protocol in terms of its conservative approach to safety and impact on the persons involved (relocation and associated stress) as well as cost. The Methyl Parathion Health Sciences Steering Committee was established by EPA to review all facets of the ongoing operation. The main finding was that the protocol developed for Lorraine, Ohio was overly protective as applied to Mississippi and the other affected states. The protocol for environmental sampling was initially designed for enforcement purposes, not exposure assessment. This was further evident by the lack of correlation between environmental levels and human exposure as measured by excretion of urinary p-NP. To a large degree the reason for the lack of significant exposure was that most (not all) of the illegal spraying was for roach control, and the bulk of the methyl parathion was applied around baseboards, inside cabinets and in cracks and crevices. Air levels were found to be low and might have contributed to exposure only for a few hours or days following spraying as the solvent carrier evaporated. Methyl parathion itself is not volatile to any significant degree. Dermal exposure was determined to be the main potential route of exposure. Evidence was also developed that strongly indicated the decline in environmental levels was much faster than initially thought. Data from the Pascagoula area strongly suggest the half-life of methyl parathion applied indoors

In This Issue

Methyl Parathion Contamination	1
Public Health Laboratory Services & Requests . . .	4

is approximately 6 - 7 months. It appeared that exposure was more a function of activity of residents than of raw or gross environmental levels.

The Methyl Parathion Health Sciences Steering Committee proposed a new protocol for environmental assessment and relocation decision making based on exposure monitoring of residents rather than on environmental levels alone. Environmental sampling was modified to reflect areas where exposure was more likely to occur. ATSDR recruited an independent expert panel to peer review the proposed protocol and, after minor changes, the states (now including Arkansas, Illinois [Chicago-Cook County], and Tennessee [Memphis-Shelby County]), EPA and ATSDR accepted and implemented the new protocol on May 19, 1997.

As the publicity from the Gulf Coast spread and enforcement investigations continued, calls were received from throughout Mississippi. By the last cutoff date for calls requesting inspections, a total of 2,745 were received from Mississippi residents. Calls were received from 52 of 82 counties. Most (1905) were from the six coastal counties (1748 from Jackson County alone) followed by 483 from the counties surrounding the Hattiesburg area and 197 from the west central counties (Hinds and surrounding counties). All environmental inspections are now complete and initial bio-monitoring (urine specimens) have been submitted. Many homes were inspected twice, once under the original protocol and again under the new. A number of callers refused inspection (over 350) when the inspectors called for an appointment.

A total of 478 families or businesses were offered relocation under the old (462) or new (28) protocol. At least 108 families have been offered periodic bio-monitoring to ensure that seasonal variations of household activities do not result in increased exposure and that exposure avoidance education is working. Over 4,500 urine specimens from approximately 3,100 persons have been collected and analyzed to date. Cost to EPA Super Fund has exceeded 70 million dollars nationally (40+ million dollars in Mississippi alone), and several state agencies had their resources severely strained.

The current protocol appears to be working well and is quite protective. Few problems have occurred other than explaining to lay individuals the differences between the new and old protocol. One unanticipated technical problem has emerged. As methyl parathion degrades in the environment, it is also converted to p-NP. This has led to problems in interpreting urinary p-NP levels, since the levels detected might be due to environmental p-NP and not physiologically metabolized methyl parathion or to a combination of the two. A small number of homes with only slightly detectable levels of methyl parathion had residents with extremely high urinary p-NP levels. Several residents had urinary levels high enough to strongly suggest severe, acute symptoms should be occurring if their urinary p-NP was the result of methyl

parathion exposure. However, all were clinically well upon investigation. EPA has conducted environmental sampling for p-NP in a number of these homes and found the environmental p-NP levels higher than methyl parathion levels in over half of the samples. Para-nitrophenol is relatively soluble in water (grams per liter range) and routine cleaning may spread this breakdown product and make exposure more likely to occur. This problem is likely to continue and actually be more prominent as the methyl parathion ages in structures.

Overall, the degree of cooperation between the many agencies has been excellent. Many of the problems and solutions worked out in Mississippi have been applied in other states. State health departments have shared their approaches with each other and with their federal counterparts. EPA Super Fund On Scene Coordinators have developed new and cost efficient decontamination and clean-up techniques, such as thermal desorption and sealants, and these techniques may be applicable to other environmental problems. Several states and EPA developed and shared software solutions for databases and tracking systems which will have utility in a number of applications. The Pesticide Branch of EPA has developed and is implementing an Urban Initiative to encourage responsible, integrated pest control, and to discourage "cheap" use of "cotton poison". In retrospect, part of the reason for the recent problems from methyl parathion stem from the term "cotton poison". In the 1950's and 60's, DDT was referred to as "cotton poison". While DDT had its share of problems, acute toxicity was not a one of them. When DDT was banned in 1972, other chemicals took its place in the cotton field and methyl parathion was one of the main replacement pesticides. Unfortunately, methyl parathion also became known as "cotton poison."

A number of unanswered questions remain. Little is known about the possible long-term effects on individuals, particularly small children, to chronic exposure to low levels of methyl parathion. A number of researchers in several states are currently formulating hypotheses to be used in an approach to this question. Federal agencies are searching for or have designated funds to support this effort.

Submitted by Bruce T. Brackin, M.P.H., Deputy State Epidemiologist, Mississippi State Department of Health.

Public Health Laboratory Services and Request for Samples

The Mississippi Public Health Laboratory (PHL) is an integral part of the disease surveillance system which is used to target interventions, and provide incidence data to care-givers and the public. There are many diseases for which positive specimens may be submitted to the PHL for confirmation or for further analysis, or for which initial specimens may be analyzed. The most important of these are discussed below.

Cultures from normally sterile areas, positive for *N. meningitidis* should be submitted to the PHL for serotyping. This allows the MSDH to better determine the need for vaccination when there is more than one case in a well-defined small population. If a culture of a normally sterile area is positive for *H. influenzae*, and the laboratory performing the culture does not routinely perform typing, the PHL requests that specimens be sent to determine if the isolate is type b. All cultures positive for *E. coli* O157:H7 should be submitted to the PHL for confirmation. These isolates are then forwarded to the Centers for Disease Control and Prevention (CDC) laboratory for DNA fingerprinting. This information can help determine if cases are related, and may lead to a possible common source. All cultures positive for *M. tuberculosis* should be sent to the PHL for confirmation, and for antibiotic sensitivity testing. If needed, they may also be forwarded to the CDC for DNA fingerprinting. It is also requested that cultures positive for *S. typhi* be submitted to the PHL for confirmation, at which

time they may be forwarded to CDC for phage typing.

The PHL is the only lab in Mississippi which performs rabies testing. To submit a specimen please call the environmentalist at your local health department. Rodents only need to be tested in very unusual circumstances.

Serum and stool specimens for toxin determination and culture for *C. botulinum*, in patients who have symptoms compatible with botulism, may be sent to the PHL to be forwarded to CDC. Please call the Division of Epidemiology (960-7725) to arrange for botulinum toxin testing, as this will expedite the process.

Confirmed vector-borne encephalitis occurs in Mississippi almost every year, and St. Louis encephalitis has the potential to be epidemic. Although the PHL currently does not perform serologic testing for arboviral infections, specimens (including serum and CSF) from patients with possible encephalitis, especially from July - October, are requested to be submitted to the PHL for testing by the CDC. This allows the MSDH to alert the public to the presence of the virus in the mosquito population.

If you have questions regarding specimen submission, or the possibility of sending specimens for other diseases not mentioned above, please call the Division of Epidemiology at 960-7725, or the PHL at 960-7582.
